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Persistence of Aroclor (Trade Name) 1254 in a Contaminated Estuary

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16. ABSTRACT

This brief report summarizes the concentrations of PCB's in oyster tissue (Crassostrea virginica) observed from April 1969 to June 1976 at three locations in the Escambia Bay estuary, following elimination of an accidental leak of Aroclor® 1254 from an industrial site. Data showed that PCB's in oyster tissued decreased after the leak was eliminated, but a steady-state concentration was reached. No Aroclor 1254 was detectable in water at stations sampled, but sediments were found to contain relatively low amounts (>0.31 ppm) in 1970 and 1971. The study demonstrates the persistence of PCB's long after point-source discharges are eliminated.

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Persistence of Aroclor 1254 in a Contaminated Estuary[1]

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In April 1969 we detected a polychlorinated biphenyl (PCB), Aroclor[R] 1254, in oysters near Devils Point in Escambia Bay, Florida. Subsequently, residues were found in blue crabs, fish, sediment, and water (DUKE et al. 1970). The source of this PCB was traced to an accidental leak from a local industry on Escambia River, 20 kilometers above initial sampling site. Aroclor 1254 entered the river from the plant's weir and was carried downstream into Escambia Bay and contiguous waters. The leak was stopped in August 1969 after the plant was notified of the problem. This brief report summarizes the concentrations of PCB's in oyster tissue (Crassostrea virginica) observed from April 1969 to June 1976 at three locations in the estuary.

From August 1969 to September 1974, water samples were collected monthly on Escambia River near the plant's weir: 274 ppb (µg/l) of Aroclor 1254, detected in August 1969, rapidly declined to less than 5.0 ppb during the remainder of 1969. By 1974 only trace amounts were detected. These low concentrations were probably leached from sediments that contained as much as 486 ppm (mg/kg) of Aroclor 1254. Our analyses of more than 300 samples of water, sediment and biota for PCB's in Escambia Bay from September 1969 through December 1971 were reported by NIMMO et al. (1971, 1975). The range in concentrations were: sediments, non-detectable (<0.010 ppm) to 30 ppm; invertebrates, non-detectable (<0.010 ppm) to 6.9 ppm; and fish from 0.29 ppm to 20 ppm. Our limited monitoring effort indicated that PCB's were distributed throughout the estuary.

For insight into the persistence of this PCB in the estuary, two sampling stations were established in Escambia Bay and one in East Bay (Fig. 1). Twelve oysters were collected monthly at each station, the meats homogenized and an aliquot was taken for analysis. Methods of analysis are described by DUKE et al. (1970).

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[R] Registered trademark

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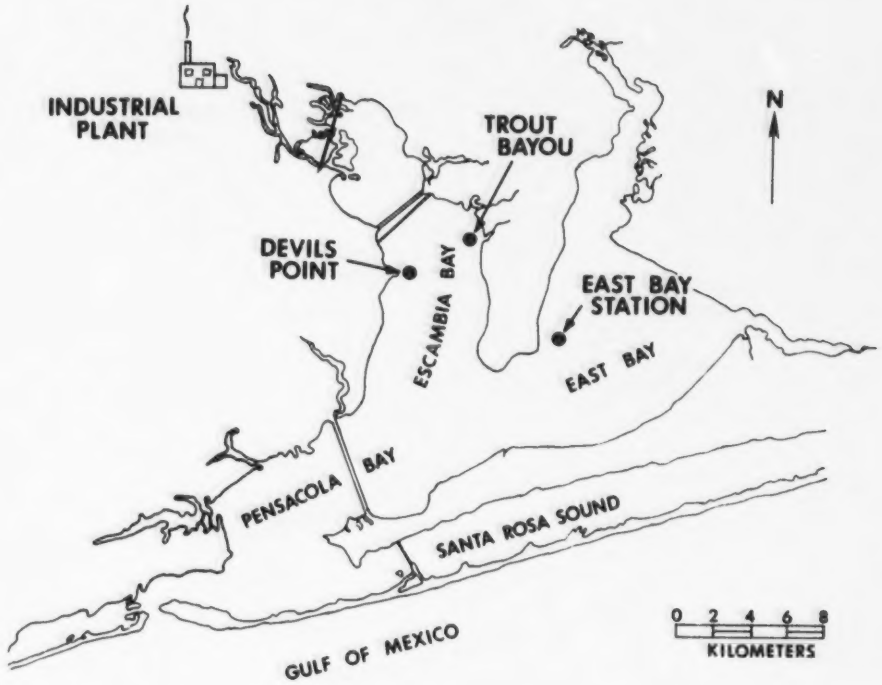

Figure 1. Sampling stations in study area.

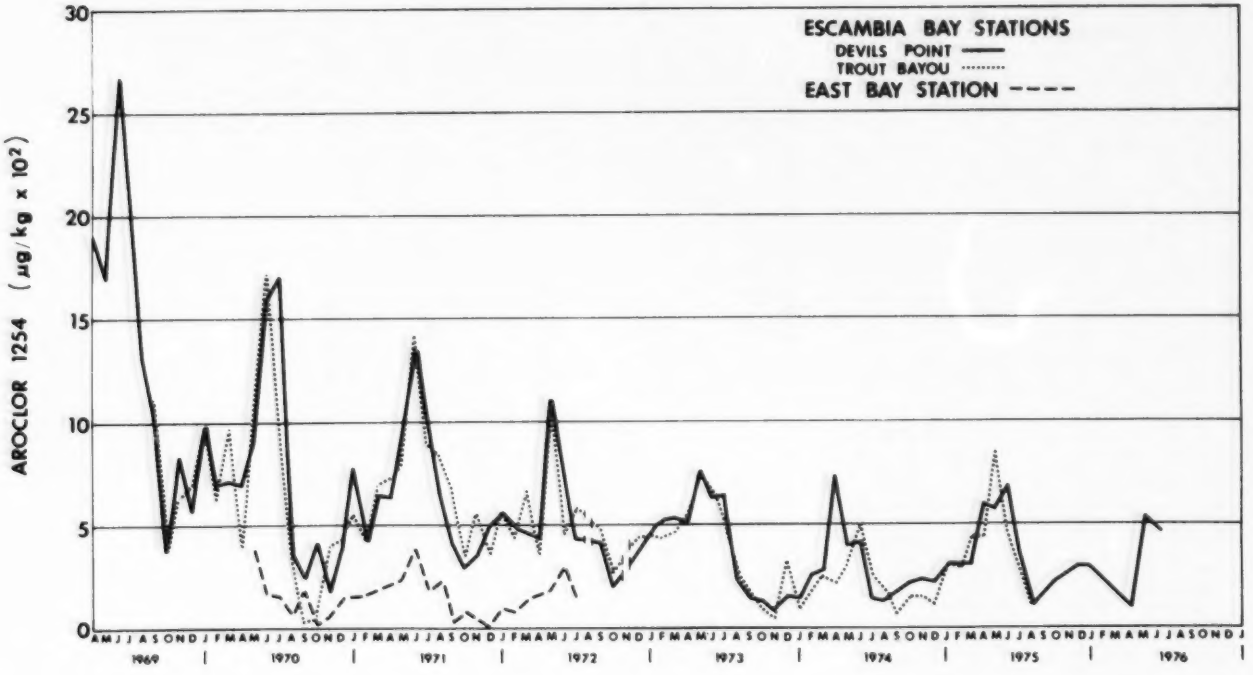

Figure 2. Aroclor 1254 residues in live oysters from Devils Point and Trout Bayou in Escambia bay and in East Bay.

Oysters generally reflect the amounts of many chlorinated hydrocarbons in water (BUTLER 1973). Figure 2 shows that PCB's in oyster tissue decreased after the leak was eliminated, but the data suggest that a steady-state concentration was reached. The annual peaks correspond to the oyster spawning period, when tissues contain relatively higher amounts of lipid. PARRISH (1974) also observed that in laboratory exposures at constant concentration of Aroclor 1254, tissue residues increased during the reproductive seasons.

Aroclor 1254 was never detected in water at our stations, but sediments contained relatively low amounts (≤0.31 ppm) in 1970 and 1971. No residue was detectable in 1972, suggesting an equilibrium between water and sediment at concentrations below analytical detection. Alternately, continued presence of PCB in oysters may be caused by leaching from the highly contaminated sediments of the upper bay and river that are carried downstream during periods of turbulence.

Polychlorinated biphenyls have chemical and physical properties similar to other chlorinated hydrocarbons and possibly to other environmental pollutants. This study demonstrated the persistence of these stable compounds long after point-source discharges were eliminated. The data may be useful for estimating the potential residence time of similar chemicals in the environment after accidental spills.

References

BUTLER, P.A.: Pestic. Monit. J. 6, 238 (1973).

DUKE, T.W., J.I. LOWE, and A.J. WILSON: Bull. Environ. Contam. Toxicol. 5, 171 (1970).

NIMMO, D.R., P.D. WILSON, R.R. BLACKMAN and A.J. WILSON: Nature 231, 50 (1971).

NIMMO, D.R., D.J. HANSEN, J.A. COUCH, N.R. COOLEY, P.R. PARRISH and J.I. LOWE: Arch. Environ. Contam. 3, 22 (1975).

PARRISH, P.R.: Proc. National Shellfisheries Assoc. 64, 7 (1974).